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Ohio Environmental Protection Agency

Permit to Install/Plan Approval Application

FOR AGENCY USE ONLY

Date Received: 8/7/00 Application Number: 01-9504 Basin Code:

Check Date: 8/13/00 Check Number: 991158 Check Amount: #528.28

1. **Project Name:**
Battelle UV Disinfection - North and Middle WWTPs

2. **Applicant:**
Name: Battelle
Mailing Address: 505 King Avenue
City: Columbus State: OH Zip: 43201-2693
Contact Name: Frank Hood Title: Vice President
Phone: (614) 424 - 4181 Fax: (614) 424 - 4902

3. **Application/Plans Prepared by:**
Name: Burgess & Niple
Mailing Address: 5085 Reed Road
City: Columbus State: OH Zip: 43220
Contact Name: Jim Ward Title: Project Manager
Phone: (614) 459 - 2050 Fax: (614) 451 - 1385

4. **Billing Address (if different than Applicant):**
Name: N/A
Mailing Address:
City: State: Zip:
Contact Name: Title:
Phone: ( ) - Fax: ( ) -

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5. **Owner (if different than Applicant):**
Name: N/A
Mailing Address:
City: State: Zip:
Contact Name: Title:
Phone: ( ) - Fax: ( )

6. **Project Location:**
Street Address or Location Description: North and middle WWTPs at West Jefferson sites
County: Madison Township/Municipality: West Jefferson
Latitude: 39N 57'56" Longitude: 83W 14'53" Method of Determination: from NPDES permit

7. **Brief Project Description:**
Convert North and Middle WWTPs from chlorine disinfection to UV disinfection

Will five acres or more be disturbed during construction of this project? Yes X No

8. a. Is this application part of a combined permit to install application? (e.g. Air + Water) ___ Yes X No
b. Has an application for a Class V injection well Permit to Install been submitted? ___ Yes X No
If yes, date submitted: _____

9. **Is this application for the construction or installation of a private sewage disposal system as specified by Ohio Revised Code (ORC) 6112.02?** ___ Yes X No
If yes, have you applied for and obtained a certificate of public convenience and necessity from PUCO as specified by ORC 6112.03? Yes No

10. **Compliance Status**
a. Does this facility have a NPDES permit? X Yes ___ No
If yes, permit numbers: OH 0005461 4IN00004* GD
b. Is this application filed in compliance with findings and orders, a consent decree, and/or NPDES permit schedule?
X Yes Effective Date of the document containing the schedule: 03 / 01 / 2000
___ No

11. **Have pollution prevention concepts been considered for this project?** ___ Yes X No
If yes, please describe (*attach additional pages if necessary*):

12. **Estimated Project Schedule:**
Beginning construction date: 11 / 01 / 2000
Ending construction date: 4 / 01 / 2001
Beginning operation date: 5 / 01 / 2001

13. **Project Cost:**
Installation/Construction Cost: $ 50,500
(Mark one): Actual_____ Bid_____ Estimate X
Annual Operation/Maintenance Cost (if applicable - this project only) $ 1,400
Are Water Pollution Control Loan Funds going to be used for this project? ___ Yes X No
If no, Funding Source: Private funds

14. **Attachments.** The following are included in this application package (indicate how many copies of each are provided):

4 Detail Plans	- Management Plan
- Engineering Report	- Hydrogeologic Site Investigation Report
4 Engineering Specifications	- Other (describe): _____

15. **Form B Submission** (check all that apply):

	Form
☐ Sewer and Pump Station Construction	B1
☐ On-Site Sanitary Wastewater Disposal	B2
☒ Wastewater Treatment Plants Less Than 100,000 GPD	B3
☐ Wastewater Treatment Plants Greater Than or Equal to 100,000 GPD and all Pond Systems	B4
☐ Industrial Direct Discharge Facility	B5
☐ Industrial Indirect Discharge Facility	B6
☐ Underground Storage Tank Remediation	B7
☐ Livestock Waste	B8
☐ Land Application or Sludge Management Plan	B9

16. **Fee Calculations:**

Permit to Install (maximum total fee $15,100)

a. Application fee:	$ 100.00
b. Plan review fee:	$ 100.00
c. Plan review fee (installation/construction cost x .0065):	$ 328.25
d. Total Fee (a + b + c):	$ 528.25

Land Application*/Livestock Plan Approval

a. Application fee:	$ 100.00
b. Plan review fee:	$ 100.00
c. Total fee (a + b):	$ 200.00

* No separate fee is needed for land application of treated wastewater if the management plan is submitted as part of the PTI application for system installation.

17. **Signature of the Applicant:** (see Ohio Administrative Code 3745-31-04)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision and that all the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are substantial penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Typed name: Frank Hood

Title: Vice President, Battelle Columbus Operations

Signature: Frank C Hood

Date: 01 Aug 00

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Ohio Environmental Protection Agency

Permit to Install/Plan Approval Application

Wastewater Treatment Plants Less Than 100,000 GPD

FOR AGENCY USE ONLY
Application Number
Date Submitted

Applicant: Battelle

Facility Owner: Battelle

Application/Plans Prepared by: Burgess & Niple

Project Name: Battelle UV Disinfection - North & Middle WWTPs

1. Design Basis

Type of Establishment	Type of Units (employees, seats, residents, etc.)	Number of Units	Sewage Flow (gal/day)	Total (gpd)
Research Facility		X	=	
Used Existing Records		X	=	
		X		
		X		
		X	=	
		X	=	

Total Hydraulic Flow = SEE BELOW

2. Influent Loads

	Middle	North	
a. Average daily design hydraulic flow (ADDF)	20,000	2,400	gallons/day
b. Design influent BOD_5 concentration	200	230	mg/l
c. Design BOD_5 loading		N/A	pounds BOD_5/day
d. Significant Runoff Period (SRP)	8	8	hours
e. Peak Factor	3.33	N/A	
f. Peak daily design flow (PDDF)	66,700	N/A	gallons/day
g. Peak Influent Flow Rate	46	7	gallons/minute

3. Effluent Concentrations and Loads (30-day avg.)

	Summer		Winter	
a. $CBOD_5$	10 mg/l	lb/day	10 mg/l	lb/day
b. Suspended Solids	9.1 mg/l	lb/day	9.1 mg/l	lb/day
c. Ammonia-Nitrogen	.07 mg/l	lb/day	.19 mg/l	lb/day
d. Fecal Coliform	200	/100 ml	200	/100 ml
e. Dissolved Oxygen	9.1	mg/l	9.4	mg/l
f. Residual Chlorine	N/A	mg/l	N/A	mg/l
g. Others:				

4. **Flood Protection**

a. 100 year flood elevation	871.00	MSL
b. 25 year flood elevation	N/A	MSL

c. **Describe measures to protect equipment:**
All electrical equipment such as ballasts, control panels, etc. will be mounted on platforms above the 100-year flood elevation.

5. **Design period:** 20 **years**

6. **Receiving Stream:** Big Darby Creek

7. **Effluent Discharge Location:** Manhole following disinfection

8. **Effluent Discharge Location Latitute/Longitude :** 39N 57'56", 83W 14'53"

9. **Flow Equalization**

a. Flow equalization basin volume: _____ gallons
b. Equalized flow: _____ gallons/day (should equal ADDF)
c. Air to be supplied: _____ cfm (with largest blower out of service)

10. **Influent Pumping Station**

a. Number of pumps: _____ pumps
b. Type of pumps: _____
c. Influent pumping rate (IPR): gpm (with largest pump out of service)

(Note: Influent pumping facilities should be able to pump the peak influent flow rate with the largest pump out of service unless a flow equalization basin is installed.)

11. **Pretreatment Device**

a. Trash trap and capacity: . Yes, . gallons . . No
b. Comminutor with bar screen bypass and capacity . Yes, ___ gallons/minute _____ No
c. Bar screen: . Number _____ Bar space opening
d. Other (state type): _____

12. **Aeration Tank Design**

a. Number of aeration tanks: _____
b. Tank arrangement: . Series ____ Parallel
c. Total tank volume supplied: _____ gallons
d. Tank detention time: _____ hours
e. Amount of air supplied: _____ .cfm (with largest blower out of service)
f. Describe the method of flow division where parallel aeration unit arrangements are planned:

13. **Final Settling Tank Design**

a. Number of settling tanks: tanks

b. Detention time: hours

c. Average surface settling rate: gpd/square foot

d. Peak surface settling rate: gpd/square foot

e. Average weir overflow rate: gpd/lineal foot

f. Peak weir overflow rate. gpd/lineal foot

14. **Describe method of scum removal and disposal:**

15. **Describe method and frequency of sludge removal and method and location of sludge disposal:**

16. **Upward Flow Fixed Media Clarifiers Design**

a. Upward peak flow rate: gpm/square foot

b. Weir overflow rate: gpd/lineal foot

17. **Sludge Management**

a. BOD_5 population equivalent flow (BPEF): BOD_5 loading lbs/day / 0.167 pounds BOD_5/PE x 100 gallons/PE = gallons

b. Sludge holding tank volume (SV): _____ gallons

c. Amount of air supplied: cfm (with largest blower out of service)

d. Number of sludge drying beds: beds

e. Total bed area: _____ square feet

18. **Check which of the following modes of advanced treatment for effluent disposal are to be installed:**

- ☐ Surface slow sand filter
- ☐ Subsurface sand filter
- ☐ Mound system
- ☐ Other: _____
- ☐ Rapid gravity sand filter
- ☐ Leaching tile field
- ☐ Lagoons
- ☐ Constructed Wetland

19. **Tertiary Dosing Device**

a. Dosing volume provided: _____ gallons (effective capacity)

b. Size of provided dosing pumps: _____ gallons/minute _____ TDH

20. **Surface Slow Sand Filters**

a. Number of surface slow sand filters: _____

b. Total sand filter area provided: _____ square feet

c. Loading rate: _____ gpd/ft^2

d. Wall height above sand beds: _____ feet

e. Source of filter sand: _____

f. Effective grain size: _____

g. Uniformity coefficient: _____

21. **Rapid Gravity Sand Filter**

a. Number of cells or units provided:

b. Total filter area provided: _____ square feet

c. Clear well capacity: _____ gallons

d. Rate of backwash: _____ gpm/square foot

e. Duration of backwash: _____ minutes

f. Number of backwash pumps: at gallons/minute

22. **Subsurface Sand Filter**

Total sand filter area provided: _____ square feet

23. **Leaching Tile Field**

Total lineal length of field: _____ feet

24. **Mound Systems**

a. Why is a mound system proposed? Please explain briefly.

b. Daily wastewater load: _____ gpd _____ gpm

c. How would you describe the site soil profile (check one)
____ impermeable soil layer (soil or bedrock) 3-4 gpd/lineal foot
____ semi-permeable soil layer 5-6 gpd/lineal foot
____ creviced bedrock 8-10 gpd/lineal foot
____ water table 3-4 gpd/lineal foot

d. Linear loading rate: _____ gpd/lineal foot

e. Basal loading rate: _____ gpd/square foot

f. Sand fill loading rate: _____ gpd/square foot

g. Mound fill depth: _____ inches

24. Mound System, cont.

h. Delivery pipe: material specification _____ diameter: inches

i. Manifold pipe: material specification _____ diameter: inches

j. Lateral pipe: material specification _____ diameter: inches

number of laterals: _____

total length: _____ feet

number of observation tubes: _____

25. Lagoons

a. Lagoon volume provided: _____ gallons

b. Number of cells:

c. Average design flow depth: _____ feet

d. Lagoon embankment slope: vertical to horizontal

26. Disinfection System

Check the type of disinfection system to be employed:

. Tablet chlorination - $Ca(OCl)_2$
. Liquid chlorination - solutions of either $Ca(OCl)_2$ or NaOCl
. Gas chlorination
X Ultraviolet
___ Other: _____

a. Chlorination:

i. Provided chlorine contact tank volume: _____ gallons

ii. Chlorine dosage rate: _____ mg/l (at peak flow)

iii. Contact time at peak flow rate: _____ minutes

b. Ultraviolet (UV) Disinfection

i. Source of UV light: bulbs

ii. Check the type of UV reactor to be employed:
X . Quartz-tube reactor (UV source immersed in wastewater)
. Teflon-tube reactor (UV source not in direct contact with wastewater)

iii. Number of UV modules: North - 1 / Middle - 3

iv. Lamps per module: 2

v. UV transmissivity quality: 65 percent

vi. UV light at a wavelength of 253.7 nm: _____ percent

vii. Minimum design dosage: 29,000 microwatts/square centimeter/second

viii. Contact time at peak flow rate: 7.5 seconds

c. Please describe the procedures that will be employed to clean and maintain the system:

Manually remove bulbs, clean bulbs on racks provided, put bulbs back in service.

27. Dechlorination ☒ N/A

Check the type of dechlorination system to be employed:

. Sodium bisulfite (solution)
. Sodium meta bisulfite (solution)
. Sulfur dioxide (gas)
___ Other: _____

a. Initial effluent chlorine residual: _____ mg/l
b. Final effluent chlorine residual: _____ mg/l
c. Amount of dechlorination agent utilized: _____ pounds (gas)
d. Amount of dechlorination agent utilized: _____ gpd (solution)
e. Concentration of dechlorination solution: _____ percent
f. Density of dechlorination solution: _____ pounds/gallon
g. Contact time based on PDDF: _____ seconds

28. **What type of flow measurement device will be installed (e.g., flow indicating, recording, totalizing, etc.)? Describe the location(s).**

Owner will be providing a cycle counter for the North WWTP siphons. It will be battery operated and can totalize flows. Owner will record flows.

29. **What type of effluent sampling equipment will be used?**

Nothing new installed

What other types of monitoring equipment will be used?

UV intensity sensor installed in channel

30. **Will a certified operator be employed to run the proposed treatment works?**

_X_ Yes, _X_ full time or part time
___ No

31. **Submittals**

This application must include the following unless otherwise directed by the Ohio EPA:

☒ Four copies of the detail plans including site plans, vicinity map, schematic diagrams, plan views, elevation views and cross-sectional views necessary to evaluate the processes
☒ Two copies of complete technical specifications
☒ Two copies of the Permit to Install/Plan Approval Application including Form A and appropriate B form(s)
☒ Fee check payable to "Treasurer, State of Ohio"

32. **The foregoing data is a true statement of facts pertaining to this proposed wastewater treatment facility(ies)**

Date: 7/28/00 Signed: James R. Ward
Engineer preparing plans

State of Ohio Environmental Protection Agency

DIVISION OF SURFACE WATER

Antidegradation Addendum

In accordance with Ohio Administrative Code 3745-1-05 (Antidegradation), additional information may be required to complete your application for a permit to install or NPDES permit. For any application that may result in an increase in the level of pollutants being discharged (NPDES and/or PTI)or for which there might be activity taking place within a stream bed, the processing of the permit(s) may be required to go through procedures as outlined in the antidegradation rule. The rule outlines procedures for public notification and participation as well as procedures pertaining to the levels of review necessary. The levels of review necessary depend on the degradation being considered/requested. The rule also outlines exclusions from portions of the application and review requirements and waivers that the Director may grant as specified in Section 3745-1-05(D) of the rule. Please complete the following questions. The answers provided will allow the Ohio EPA to determine if additional information is needed. **All projects that require both an NPDES and PTI should submit both applications simultaneously to avoid going through the antidegradation process separately for each permit.**

A. **Applicant:** Battelle - West Jefferson Sites- North and Middle WWTPs

Facility Owner: Battelle

Facility Location (city and county): West Jefferson, Madison County

Application or Plans Prepared By: Burgess & Niple

Project Name: Battelle UV Disinfection

NPDES Permit Number (if applicable): 4IN00004 * GD

B. **Antidegradation Applicability**

Is the application for? (check as many as apply):

_____ Application with no direct surface water discharge (Projects that do not meet the applicability section of 3745-1-05(B)1, i.e., on-site disposal, extensions of sanitary sewers, spray irrigation, indirect discharger to POTW, etc.). (Complete Section E)

X Renewal NPDES application or PTI application with no requested increase in loading of currently permitted pollutants. (Complete Section E, Do not complete Sections C or D).

_____ PTI and NPDES application for a new wastewater treatment works that will discharge to a surface water. (Complete Sections C and E)

_____ An expansion/modification of an existing wastewater treatment works discharging to a surface water that will result in any of the following (PTI and NPDES):(Complete Section C and E)

- addition of any pollutant not currently in the discharge, or
- an increase in mass or concentration of any pollutant currently in the discharge, or
- an increase in any current pollutant limitation in terms of mass or concentration.

_____ PTI that involves placement of fill or installation of any portion of a sewerage system (i.e., sanitary sewers, pump stations, WWTP, etc.)within 150 feet of a stream bed. Please provide information requested on the stream evaluation addendum (i.e., number of stream crossings, fill placement, etc.) and complete section E.

_____ Initial NPDES permit for an existing treatment works with a wastewater discharge prior to October 1, 1996. (Complete Sections D and E)

_____ Renewal NPDES permit or modification to an effective NPDES permit that will result in any of the following:(Complete Section C and E)

- a new permit limitation for a pollutant that previously had no limitation, or
- an increase in any mass or concentration limitation of any pollutant that currently has a limitation.

C. Antidegradation Information

1. Does the PTI and/or NPDES permit application meet an exclusion as outlined by OAC 3745-1-05(D)(1) of the Antidegradation rule?

   _____ Yes (Complete Question C.2)

   _____ No (Complete Questions C.3 and C.4)

2. For projects that would be eligible for exclusions provide the following information:

   a. Provide justification for the exclusion.

   b. Identify the substances to be discharged, including the amount of regulated pollutants to be discharged in terms of mass and concentration.

   c. A description of any construction work, fill or other structures to occur or be placed in or near a stream bed.

3. Are you requesting a waiver as outlined by OAC 3745-1-05(D)(2-7) of the Antidegradation rule?

   _____ No

   _____ Yes

   If you wish to pursue one of the waivers, please identify the waiver and submit the necessary information to support the request. Depending on the waiver requested, the information required under question C.4 may be required to complete the application.

4. For all projects that do <u>not</u> qualify for an exclusion a report must accompany this application evaluating the preferred design alternative, non-degradation alternatives, minimal degradation alternatives, and mitigative techniques/measures for the design and operation of the activity. The information outlined below should be addressed in this report. If a waiver is requested, this section is still required.

a. Describe the availability, cost effectiveness and technical feasibility of connecting to existing central or regional sewage collection and treatment facilities, including long range plans for sewer service outlined in state or local water quality management planning documents and applicable facility planning documents.

b. List and describe all government and/or privately sponsored conservation projects that may have been or will be specifically targeted to improve water quality or enhance recreational opportunities on the effected water resource.

c. Provide a brief description below of all treatment/disposal alternatives evaluated for this application and there respective operational and maintenance needs. (If additional space is needed please attach additional sheets to the end of this addendum).

Preferred design alternative:_____

Non-degradation alternative'(s):_____

Minimal degradation alternative'(s):_____

Mitigative technique/measure'(s):_____

At a minimum, the following information must be included in the report for each alternative evaluated.

d. Outline of the treatment/disposal system evaluated, including the costs associated with the equipment, installation, and continued operation and maintenance.

e. Identify the substances to be discharged, including the amount of regulated pollutants to be discharged in terms of mass and concentration.

f. Describe the reliability of the treatment/disposal system, including but not limited to the possibility of recurring operation and maintenance difficulties that would lead to increased degradation.

g. Describe any impacts to human health and the overall quality and value of the water resource.

h. Describe and provide an estimate of the important social and economic benefits to be realized through this proposed project. Include the number and types of jobs created and tax revenues generated.

i. Describe environmental benefits to be realized through this proposed project.

j. Describe and provide an estimate of the social and economic benefits that may be lost as a result of this project. Include the impacts on commercial and recreational use of the water resource.

k. Describe the environmental benefits lost as a result of this project. Include the impact on the aquatic life, wildlife, threatened or endangered species.

l. A description of any construction work, fill or other structures to occur or be placed in or near a stream bed.

m. Provide any other information that may be useful in evaluating this application.

D. Discharge Information

1. For treatment/disposal systems constructed pursuant to a previously issued Ohio EPA PTI, provide the following information:

PTI Number _____-_____
PTI Issuance Date _____
Initial Date of Discharge _____

2. Has the appropriate NPDES permit application form been submitted including representative effluent data?

_____ Yes (go to E)

_____ No (see below)

If no, submit the information as applicable under a OR b as follows:

a. For entities discharging process wastewater attach a completed 2C form.

b. For entities discharging wastewater of domestic origin attach the results of at least one chemical analysis of the wastestream for all pollutants for which authorization to discharge is being requested and a measurement of the daily volume (gallons per day) of wastewaters being discharged.

E. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate and complete.

This section must be signed by the same responsible person who signed the accompanying permit application or certification as per 40 CFR 122.22.

Signature Frank Cleveland

Date 01 Aug 00

Scope of Work and Specifications

Battelle

West Jefferson Sites
Ultraviolet Disinfection Improvements

September 2000

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TABLE OF CONTENTS

BATTELLE

WEST JEFFERSON SITES

ULTRAVIOLET DISINFECTION IMPROVEMENTS

SCOPE OF WORK

This Contract involves converting three small Wastewater Treatment Plants (WWTPs) at the Battelle West Jefferson Sites from chlorine disinfection to ultraviolet (UV) disinfection.

The construction shall include the furnishing of all labor, tools, equipment, and materials for the following as specified herein and as shown on the drawings:

A. Demolition of selected components of the existing chlorine contact tanks.

B. Furnishing and installing three package UV systems including start-up and testing.

C. Pouring fill concrete into the three existing chlorine tanks to dimensions shown.

D. Furnishing and installing elevated wooden platforms for the UV control equipment.

E. Electrical work including bringing power to each site, all control and signal wiring, and platform lighting.

The work shall also include other necessary and appurtenant items.

The contract work shall be complete and ready for testing of the ultraviolet disinfection system by April 1, 2001. Testing by the Owner will be complete by May 31, 2001. A retainage of 10 percent of the project cost will be held until the equipment is accepted by the Owner after it meets all requirements of the specifications.

27210*0000*1*8/4/00
DEB:am

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1, and all related specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

A. **Scope of Work.** Provide all labor and materials necessary to furnish the submittals as specified.

1.3 QUALITY ASSURANCE

A. **Verification**. The Contractor shall verify the correctness and completeness of all submittals prior to forwarding same to the Engineer/Architect for review. Contractor shall not make submittals to the Engineer/Architect that do not comply with the Contract Documents. Cost to review any submittal more than twice will be deducted from Contractor's monthly estimates and final payments.

B. **Approval**. Each submittal shall bear the Contractor's approval stamp, signature, and date of approval. The approval stamp shall state that the submittal is in accordance with the Contract Documents. The Contractor shall also identify any deviations in the submittal from the drawings and/or specifications.

1.4 SUBMITTALS

A. **General**. Provide the following as required by each individual section of the specifications.

1. Shop drawings.
2. Product data.
3. Samples.
4. Operation and Maintenance (O&M) manuals.
5. Personnel qualifications.
6. Operator training/lesson plans.
7. Installation/inspection data.
8. Performance test reports.
9. Product/material certifications.

10. Others including:

a. Special warranties.
b. Special tools/repair parts lists.
c. Project record documents.
d. Construction schedules.

1.5 JOB CONDITIONS

A. **Schedule**. All submittals shall be submitted in a timely manner and in conformance with the schedule for shop drawings and samples.

1.6 DELIVERY, STORAGE, AND HANDLING

A. **Delivery**. The following minimum number of submittals will be required for each of the following:

	Shop Drawings	8
2.	Product Data	8
3.	Samples or Mock-ups	2
4.	O&M Manuals	6
5.	Personnel Qualifications	6
6.	Operator Training/Lesson Plans	6
7	Installation/Inspection Data	6
8.	Performance Test Reports	6
9.	Product/Material Certifications	6
10.	Other	
	a. Special Warranties	6
	b. Special Tools/Repair Parts Lists	6
	c. Project Record Documents	

B. **Storage**. The Contractor shall maintain and make available to the Engineer/Architect, at the job site, a complete file of all approved submittals as part of the project record documents.

C. **Handling**. All submittals marked "Revise and Resubmit" or "Return for Corrections" shall be corrected as soon as possible by the Contractor, subcontractor, supplier, or manufacturer and returned to the Engineer/Architect by the Contractor in the same manner as outlined above.

1.7 SPECIAL WARRANTY

Not used.

PART 2 - PRODUCTS

2.1 **SHOP DRAWINGS.** A shop drawing is a detailed representation of the work to be performed including material and equipment layout, fabrication drawings, system and electrical schematic diagrams, equipment and material schedules, and installation details. Shop drawings show materials, equipment, systems, and installations accurately and in such detail as to indicate all pertinent features and connections and to demonstrate compliance with the Contract Documents.

A. **Example.** The following submittal documents are some examples of items categorized as shop drawings:

1. Equipment/Material Layout Drawings. Include plot plans, plant site maps, equipment location plans, equipment and material layout plans and sectional views, connection detail drawings, and similar drawings showing the incorporation of materials and equipment into the work. They shall show, to scale, the physical layout, including elevations, plant grid coordinates, dimensions to new/existing structures, and other items of the work, and shall include dimensions, labeling, notes, legends, bills of materials, and all other information required to graphically describe the proposed work.

B. System Schematics and Diagrams

1. These include schematic representations of systems and equipment in a manner which shows the relative relationship of the components within the system and interconnections or interfaces with other systems or equipment.

2. These systems shall be shown on the most appropriate type and format of schematic diagram. Diagrams shall identify all equipment and other components. Indications shall be provided of system features such as flow directions, flow ranges, component sizes, capacities, settings, interlocks, component identification, and component or subsystem function.

3. Various types of systems for which schematic diagrams shall be required include:

a. Process Piping Systems.
b. Plumbing and Utility Piping Systems.
c. Heating and Air Conditioning Systems.
d. Ventilating Systems.
e. Pneumatic Systems.
f. Hydraulic Systems.
g. Conveying Systems.
h. Process and Chemical Feed Equipment Systems.

i. Electrical Distribution Systems.
j. Control Systems.
k. Alarm Systems.
l. Communication Systems.

4. In some instances it may be appropriate to combine multiple types of system schematics onto a single drawing. In general, this practice would be appropriate for simple, self-contained systems and the adjacent subsystems and when required to clearly show system functionality.

C. **Quality of Shop Drawings and Submittal Information**

1. Standard Units. All dimensions, weights, calculations, and similar numerical expressions shall be provided in United States standard units.

2. Originals. Shop drawings and submittal information shall be generated, drawn, or produced by the Contractor or its subcontractor or suppliers. Reproductions of partial (or complete) versions of the Contract Documents, plans, sections, details, schematics, specification pages, etc., from the Contract Documents shall not be acceptable. All shop drawings and submittal information shall be complete and detailed so as to clearly describe the equipment to be furnished. The requirements include complete component descriptions; verifications of all materials of construction; component weights; anchor bolt layout drawings; dimension drawings, including all options and accessories shown in their installed location(s); painting and coating information; metal finish designations; shipping and handling instructions; storage instructions; installation instructions; specific operating requirements such as electrical service, water and/or air volumes and pressures, drains, etc.; operating curves; special supports and braces; shop and field welding information; and all other such information necessary to define the exact nature and extent of the products being submitted. Equipment submitted with electrical components or controls shall include similarly detailed information, including enclosure type, materials, size and mounting, component data, wire sizes, wire numbering, point-to-point wiring diagrams, functional descriptions, control circuits, etc.

3. Identification. All submittal related documents shall be properly identified via a specific title, descriptions, date, and drawing or page number, and shall be arranged in a logical order to best present the submittal information. Whenever possible, submittal indexes shall be provided. Identification shall include the following:

a. Manufacturer's name and drawing number.
b. Submittal date and revision number, if applicable.
c. Contract identification and specification section.
d. Drawing scale and orientation.
e. Submittal page number or sequence of pages.

4. Verification. Where existing conditions or structures exist, field verification of dimensions, elevations, clearances, etc., shall be made. The submittal shall not be accepted for review until such verified data is clearly indicated on the submittal drawings and so identified.

Legends. All submittal diagrams, drawings, schematics, etc., shall include complete keys, legends or similar explanation as to the graphics, and symbols and abbreviations used. In general, all graphics, symbols, abbreviations, and equipment nomenclature used for a submittal shall duplicate those used on the Contract Drawings in order to avoid confusion or misinterpretation.

2.2 PRODUCT DATA

A **General.** Product data is submittal information that fully describes the item to be incorporated into the work. Product data shall include:

1. Catalog cut-sheets.
2. General descriptive bulletins/brochures/specifications.
3. Materials of construction data.
4. Finish/treatment data.
5. Equipment/material weight/loading data.
6. Power/utility requirements.
7. Engineering design data, calculations, and system analyses.
8. Digital system documentation.
9. Other information specifically called for under the sections of Divisions 2 through 16 shall be included in this category.

B **Complete Details.** All product data shall include sufficient detail for the Engineer/Architect to fully review and evaluate the product or equipment and to determine compliance with each feature and condition required.

2.3 SAMPLES OR MOCK-UPS

A **Samples.** Samples are portions of or complete units of the precise article proposed to be furnished.

B **Color and Pattern Charts.** When the precise color and pattern are not specifically prescribed in the Contract Documents, or when the Contract Documents require that a product be furnished in a color or pattern directed by the Owner or Owner's Representative, submit accurate color charts and pattern charts of the available ranges for review and selection.

C **Mock-ups.** Mock-ups are to be built with full size products to match the scale of the proposed structures, machines, assemblies, apparatus, etc., provided to demonstrate compliance with specified requirements and to establish construction standards.

2.4 O&M MANUALS

A. **Operational and Maintenance Information.** Information shall be submitted to provide the Engineer/Architect with information regarding the incorporation of the equipment into the work and with functional data to evaluate equipment operation. This information shall include:

1. Operation Sequence Descriptions. These shall be complete, detailed written descriptions of the operating sequence of all control systems and operations in all modes. The descriptions shall be specifically prepared for this work and shall be fully referenced to control diagrams and system components. The descriptions shall include start-up and shut-down procedures and operations under manual, automatic, and emergency (alarm) conditions and any alternate operating modes. Descriptions of system reactions and sequencing including the operation of switches, lights, timers, relays, contacts, valves, motors, and equipment components shall be included. Interlock functions shall be fully described including system safety functions.
2. Software/Programming Documentation. This documentation shall be referenced to the Operating Sequence Descriptions and shall include flow charts, program source codes listings, and documentation ladder diagrams with detailed descriptions for each rung for the software provided. Information shall be provided to instruct and to familiarize the operator and shall be reviewed with the system programming to enable a step-by-step evaluation of the program. Notations, remarks, and labeling shall be provided on the program source code listing to indicate the program operation and function. Any additional narrative description of the program operation shall be provided to fully describe the system parameters and functionality in a clear and logical manner.
3. Manufacturer's Instructions. This shall include instruction for storage, installation, routine preventive maintenance, and lubrication. This data shall include instructions that describe the proper procedure for moving, supporting, and anchoring of equipment, including tolerances for settings and adjustment. Also included shall be the storage requirements and procedures to protect products prior to installation, and once installed, prior to start-up/periods of prolonged shut-down; and proper storage of repair parts.
4. Warranties and Guarantees. This shall include equipment manufacturer's warranties and any special warranties as specified in individual sections.

2.5 PERSONNEL QUALIFICATIONS

A. **General.** These qualification statements and information pertain to personnel and entities employed in the prosecution of the work. Where specifically called for by the Contract Documents, qualifications of the following are to be provided:

1. Contractor's employees.
2. Manufacturers.
3. Manufacturer's representatives.

4. Fabrication/installation subcontractors.
5. Vendors/suppliers.
6. Testing/certification laboratories.
7. Design engineer/technicians.
8. Other inspectors, installers, and training personnel.

B. **Specific Information.** As applicable or as specified to demonstrate proper qualifications, the following information regarding the proposed personnel or entity shall be provided:

1. Education/training.

2. Company employment history.

3. Experience.

   a. Similar work or projects.
   b. Related work.

4. References.

5. Certifications or licenses.

Stated qualifications shall be pertinent to the specific task for which qualifications are requested.

2.6 OPERATOR TRAINING/LESSON PLANS

A. **Instructional Materials.** Operator training data shall include all instructional materials and copies of audio/visual aids.

B. **Lessons and Schedules.** Lesson plans contain a statement of the instructional objectives of the training, a training outline and agenda, audio/visual requirements, a listing of proposed training materials to be used, and desired schedule dates and times.

2.7 INSTALLATION/INSPECTION DATA

A. **Installation.** Installation data includes instruction provided by the manufacturer of the product or equipment which indicates its recommendations for handling, methods and sequencing of installation, and installation conditions. The instructions shall include installation tolerances, clearance requirements, restrictions, anchoring orientation, required adjustments, all conditions affecting proper adjustments, and all conditions affecting proper installation and connections to adjacent work. Also included are demolition information, painting application data, Contractor equipment data, and notifications of conditions detrimental to the proposed installation.

B. **Inspection.** Inspection data includes inspection procedures and results of field or factory inspections of products, equipment, or systems. Within this type of submittal information are factory witness test procedures, schedules and reports,

field installation logs and reports, installation alignment reports, and similar data.

2.8 **PERFORMANCE REPORTS/TEST DATA**

A **Performance.** Performance reports are the reports on the operation of equipment of systems to demonstrate compliance with specified operating parameters. Included are operations demonstration requests, logs and reports, report forms, life cycle data, start-up and testing plans, and verification of operating descriptions.

B. **Testing.** Test data is the information leading to or resulting from tests performed on materials, equipment, or systems either installed, at the manufacturer's facilities, or in testing laboratories. This also includes data on testing equipment. Examples of test data include all information, test arrangement, drawings, illustrations, diagrams, curve plots, graphs, and other data which substantiates or establishes a material or product characteristic, quality, or other trait as a result of performing test required by the Contract Documents.

2.9 **PRODUCT/MATERIAL CERTIFICATIONS.** These include signed certificates or declarations by the Contractor, supplier, manufacturer, testing laboratory, or recognized certification agency which document that materials and product composition or construction comply with specified requirements and stated reference standards.

2.10 **OTHER.** These include special warranties, special tools/repair parts list, project record documents, drawings, reports, data, and information required by the Contract Documents which do not logically fall into the submittal types defined above.

PART 3 - EXECUTION

3.1 **EXAMINATION.** Contractor shall review and examine all shop drawings, product data, samples, operation and maintenance manuals, personnel qualifications operator training/lesson plans, installation/inspection data, performance test reports, product/material certifications, and other information or materials for compliance with the Contract Documents prior to submittal for approval.

3.2 **PREPARATION.** Contractor shall prepare a schedule for submittal of shop drawings, product data, samples, operation and maintenance manuals, personnel qualifications, operator training/lesson plans, installation/inspection data, performance test reports, product/material certifications, and other information or materials for compliance with the Contract Documents prior to submittal for approval. This schedule shall be coordinated with the CPM or bar chart schedule as required by the Contract Documents.

3.3 **DISTRIBUTION.** Based upon the submission of the minimum number of required approved submittals, the Engineer/Architect will make the following distribution:

	Submittal	No. of Approved Submittals (Minimum)	Distribution Owner	Contractor	Engineer/ Architect
1.	Shop Drawings	8	2	4	2
2.	Product Data	8	2	4	2
3.	Samples/Mock-Ups	0	2	0	1
4.	O&M Manuals	6	4	1	1
5.	Personnel Qualification	6	4	1	1
6.	Operation Training/ Lesson Plans	6	4	1	1
7.	Installation/Inspection Data	6	4	1	1
8.	Performance Test Reports	6	1	3	2
9.	Product Certification	6	1	3	2
10.	Other	6	1	3	2

	Submittal	No. of Approved Submittals (Minimum)	Distribution Owner	Contractor	Engineer/ Architect
a.	Special Warranties	6	4	1	
b.	Special Tools/ Repair Parts Lists	6	4		
c.	Project Record Documents	1	1	0	0

3.4 O&M MANUALS

A. **Start-up and Training**. One copy of the approved O&M manuals shall be shipped to the site by the Contractor prior to start-up of the equipment and shall be used as a textbook during training of Owner personnel. The Contractor shall not be permitted to begin equipment start-up and training without all copies of the approved O&M manuals on-site.

3.5 SAMPLE PANELS

A. **Construction**. When the Contractor is required to provide sample panels, they shall be constructed on site by the Contractor. Sample panels shall be constructed only after the individual samples and components used in the sample panel have been noted as conforming with Contract Documents by the Engineer/Architect. If a sample panel does not conform to the Contract requirements, Contractor shall construct additional ones until conformance is achieved.

B. **Storage.** Contractor shall store and protect large samples and mock-ups until the Project is completed, then properly dispose of off site.

3.6 SAMPLES FOR TESTS

A. **Contractor shall furnish** such samples of material as may be required for examination and test. All samples of materials for tests shall be taken according to standard methods or as provided in the Contract Documents.

3.7 ENGINEER/ARCHITECT'S ACTION

A. **General**. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Engineer/Architect will review each submittal, mark to indicate action taken, and return promptly.

Compliance with specified characteristics is the Contractor's responsibility.

B. **Action Stamp**. The Engineer/Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. Final Unrestricted Release. Where submittals are marked "Approved" that part of the work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.

2. Final-But-Restricted Release. When submittals are marked "Approved as Noted," that part of the work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.

3. Returned for Resubmittal. When submittal is marked "Not Approved" and/or "Revise and Resubmit," do not proceed with that part of the work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.

    a. Do not permit submittals marked "Not Approved" and/or "Revise and Resubmit" to be used at the project site or elsewhere where work is in progress.

END OF SECTION

SECTION 11347

ULTRAVIOLET DISINFECTION EQUIPMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1, and all related specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

A **Scope of Work.** The Contractor shall provide all labor, tools, equipment, and materials necessary to furnish and install complete, tested, and ready for continuous service, three open channel gravity flow ultraviolet (UV) disinfection systems in accordance with the plans and as specified herein.

1.3 QUALITY ASSURANCE

A. **Codes and Regulatory Agencies.** Perform all work in compliance with all federal, state, and local codes and regulatory agencies.

NEC - National Electric Code.

B. **Standards.** Materials and workmanship shall be in accordance with the following standards:

1. ANSI - American National Standards Institute.
2. ASTM - American Society for Testing and Materials.
3. IEEE - Institute of Electrical and Electronic Engineers.
4. NEMA - National Electrical Manufacturers Association.

C. **Qualifications**

Manufacturer. Products used in this section shall be produced by a manufacturer who is fully experienced, reputable, and qualified in the manufacture of UV disinfection equipment and with a history of minimum five similar successful installations. All equipment and items specified herein shall be obtained from a single manufacturer.

1.4 SUBMITTALS

A. **Bid Data.** Furnish a list of similar equipment installations as close as possible to this project at the time that bids are submitted.

B. **Product Data.** Furnish manufacturer's product data including cut sheets, equipment specification, and general descriptive brochures for review in accordance with Section 01300.

C. **Shop Drawings.** Shop drawings shall be submitted to the Engineer/Architect for review. Shop drawings shall be in accordance with Section 01300 and shall include the following:

1. Manufacturer's name and model number.
2. Dimensional layout and required clearances.
3. Materials of construction.
4. Weights.
5. Performance data.
6. Electrical data including wiring diagrams.
7. Installation and operation instructions.
8. Warranty.

D. **Operation and Maintenance (O&M) Manuals.** The initial review copy and six revised copies of the O&M manual shall be submitted to the Engineer/Architect in accordance with Section 01300 and prior to delivery of the UV disinfection equipment. The O&M manuals shall include:

1. Storage instructions.
2. Installation instructions and details.
3. Start-up instructions.
4. Shutdown instructions.
5. Operation, maintenance, repair, and cleaning instructions.
6. Detailed parts list for all equipment items including part numbers.
7. Recommended spare parts and maintenance materials list.
8. Supplier telephone numbers and addresses.
9. Shop drawings.

E. **Special Warranty.** Submit the manufacturer's warranties:

1. Against defects in workmanship and material for 1 year from start-up.
2. Lamps, minimum of 8,600 hours.

F. **Test Reports**

Field Test Reports. Test reports shall be submitted within 48 hours of completion, suspension, or termination of the Contractor's testing of the UV equipment.

a. Manufacturer's Representative Reports. Manufacturer's representative reports shall include adjusting, balancing, dry testing, and wet testing of the equipment in accordance with the requirements of this specification section. Product and material certifications and inspection data as specified in Section 01300 shall be included with this report(s).

b. Dry Test Report. Dry test report shall be in accordance with the requirements of this specification section.

c. Wet Test Report. Wet test report shall be in accordance with the requirements of this specification section.

d. Operational Demonstration Report. Operational demonstration report shall be in accordance with the requirements of this specification section.

1.5 JOB CONDITIONS

A. **Coordination.** Coordinate all work to prevent delays, errors, and/or omissions.

B. **Environmental Requirements.** The UV disinfection equipment shall be suitable for outdoor location with exposure to locally variable climatic conditions including temperature, lightning, and weather conditions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. **Delivery.** All units shall be shipped assembled as much as practical. All units shall be labeled with all labeling intact and legible with item name, model number, size, and manufacturer's name.

B. **Storage.** All units, accessories, and components shall be stored in the manufacturer's original package, under cover and protected from damage.

C. **Handling.** Handle all units and components in accordance with the manufacturer's instructions. Use lifting rings and canvas harnesses for lifting to prevent scratching or abrading finished surfaces.

1.7 SPECIAL WARRANTY

A. **The Contractor** shall obtain a special warranty from the manufacturer written to the Owner to warrant all equipment furnished from the manufacturer to be free of defects in material and workmanship as specified herein. The lamps supplied shall be warranted for a minimum 8,600 hours. Any equipment failure or defects occurring during the special warranty period shall be repaired or replaced at no cost to the Owner. The period for the special warranty shall begin upon receipt of written notification to the manufacturer from the Owner at the time the UV equipment passes the acceptance test.

PART 2 – PRODUCTS

2.1 PERFORMANCE AND DESIGN REQUIREMENTS.

The UV disinfection systems shall reduce the fecal coliform count to less than 200/100 milliliter (ml) geometric mean for any 30 day period.

A. **Dosage Design Method**

1. Method shall follow the guidelines in *EPA/625/1-86/021 U.S. EPA Design Manual for Municipal Wastewater Disinfection.*

2. Design UV system for transmittance of 65 percent.

B. **UV Dose.** The UV disinfection system shall provide a minimum dosage of 29,000 microwatt-seconds per square centimeter at peak flow after 1 year (8,760 hours) of lamp operation measured in an effluent with 65 percent UV transmittance at 253.7 nanometer (nm) and with lamp output at 65 percent of its initial level after 1 year of operation with no fouling on the sleeves.

C. **Head Loss.** The head loss through the entire UV channel, including the head loss created by the internal UV weir shall not exceed 7 inches at peak flow.

D. **Average Nominal Intensity.** The average nominal intensity within the UV bank shall not be less than 6,150 microwatts/cm^2 after 100 hours burn-in at 65 percent transmission and with no fouling on the lamp sleeves.

E. **UV Density.** The UV density of the reactor shall not be less than 3.35 watts per liter.

F. **Retention Time.** The actual retention time of the effluent within the system determined by hydraulic analysis shall not be less than 0.9 times the theoretical retention time. The theoretical retention time shall not be less than 7.50 seconds at the peak design flow rate.

G. **Effluent Characteristics.** The plant shall produce an effluent at the flow rate and within the minimum quality characteristics shown in the schedule in Part 4 of this section.

2.2 EQUIPMENT

A. UV Disinfection Modules

Materials. All wetted metal parts shall be constructed of Type 304 (L series for weldments) stainless steel. All materials and wire exposed to UV light shall be unaffected by prolonged exposure. All wiring exposed to UV shall be teflon coated. All materials exposed to UV shall be Type 304 stainless steel, anodized aluminum, Type 214 quartz, or teflon. The UV lamps are to be protected from contact with the effluent by a quartz jacket with a minimum UV light transmittance of 89 percent at 253.7 nm wave length and have a nominal wall thickness of 1.0 to 2.0 mm.

2. Module. Each module shall contain two UV lamps enclosed in individual quartz sleeves. The module shall be constructed to withstand outdoor exposure and watertight submergence. Individual quartz sleeves shall have one end closed and the other sealed by a lamp end seal and holder. Lamp modules shall contain no circuit boards.

   a. Each UV module shall be provided with a 120 volt plug and weatherproof cable for connection to the power supply box.

b. Modules shall weigh no more than 40 pounds and shall be individually removable without using mechanical lifting devices. Materials of construction shall be stainless steel Type 304, anodized aluminum, or teflon.

c. Each module shall be removable from the channel without affecting the operation of the remaining modules.

B. **UV Lamps.** Modules shall utilize low pressure mercury vapor lamps with hot cathode instant start design. Each lamp shall produce UV light with at least 90 percent of the UV emission at 233.7 to 273.7 nm wave length.

Output. The UV manufacturer shall warrant that after 8,760 hours of operation, the UV lamp output will be no less than 65 percent of a new lamp (after 100 hours initial burn-in).

2. Manufacturers. The units shall be capable of using lamps from at least two active manufacturers without modifications to the units.
3. Power. Maximum power consumption per lamp shall be 85 watts.
4. The open end of the lamp sleeve shall be sealed by means of a sleeve nut which threads onto a sleeve cup and compresses the sleeve O- ring.
5. The sleeve nut shall have a knurled surface to allow a positive hand grip for tightening. The sleeve nut shall not require any tools for removal.

C. **Level Control Weir**

Description. A level control weir shall be placed at the discharge end of the channel to ensure that the UV lamps are submerged irrespective of the flow rate.

2. Water Level. The level of the water shall be maintained at a constant $\pm$1.5 inch variation, within the minimum/maximum flow conditions.
3. Weir shall be welded watertight.

D. **Effluent Channel**

The UV unit shall come complete with one stainless steel Type 304, 14 gauge effluent channel complete with drain, UV module support rack, and downstream weir.

2.3 ELECTRICAL AND MONITORING SYSTEM

A. **Electrical**

1. Electrical supply shall be 120 volt, 60 hertz.
2. Provide receptacles protected with a GFI mounted at the bottom of the power supply box. Connections shall be waterproof.
3. Provide 120 volt weatherproof connecting cables from the power distribution box to the UV modules.
4. Each UV module shall have separate power cable.

B. **Monitoring.** Provide a monitoring system enclosed in a NEMA 4X panel with one lockable latch.

UV Intensity Monitoring. Provide one submersible UV intensity sensor which responds only to the germicidal portion of light generated. The sensor shall continuously monitor the UV intensity produced in the bank of UV lamp modules.

2. UV Intensity Display. The intensity measured by the UV sensor shall be indicated on the display.

   a. UV Intensity Alarm. Provide a dry contact for low UV intensity alarm.

C. **UV Lamp Monitoring.** Provide elapsed time meters for UV lamp monitoring.

2.4 CLEANING SYSTEM

A. **Modular Cleaning.** The UV modules must be removable from the channel for cleaning.

1. Provide one Type 304 stainless steel freestanding rack for placement of the UV modules during cleaning at each site for a total of three racks in this project.
2. Provide a total of 6 gallons of cleaning solution.

2.5 **SPARE PARTS AND SAFETY EQUIPMENT.** The UV supplier shall furnish as part of the system the following spare parts and safety equipment:

A. **A total of** four UV lamps.

B. **A total of** four quartz jackets.

C. **A total of** four sets of lamp end seals.

D. **All spare parts** are to be separately packaged and suitable for long term storage. All packages are to have bill of materials with quantity, item description, and part number.

E. **Provide a total of** two face shields for protection against UV energy between 200 and 400 nm.

2.6 **MANUFACTURER.** The UV equipment manufacturer shall be Capital Controls Group, Ultra Dynamics Division, (Tim Olden [215] 997-3764); Wedeco Ideal Horizons (Ted Baker [440] 461-4577) IDI Aquaray (Paul Matrka [614] 876-7318); Ecometrics (Michael Voshefski [740] 335-6517).

PART 3- EXECUTION

3.1 EXAMINATION

A. **Site Verification of Conditions.** Verify that surfaces are ready to receive work and the following conditions:

1 Supports for the UV equipment are properly installed.

B. **Responsibility.** Beginning the installation means the installer accepts that the existing surfaces are acceptable for installation.

3.2 PREPARATION

A. **Protection.** Protect adjacent surfaces against damage during installation.

3.3 INSTALLATION

A. **Alignment.** Ensure that each UV module is in alignment and not binding during installation and removal.

3.4 FIELD QUALITY CONTROL

A. **Adjusting.** Adjust all parts and components for proper operation.

B. **Manufacturer's Field Service.** Retain a qualified factory trained representative of the manufacturer to perform the following services:

1 Check installation of equipment and accessories specified herein.

2. Inspect the completed installation and note deficiencies.

3. Assist Contractor during operation, adjusting, and field testing of completed installation.

4. Prepare installation report and submit immediately after completion of field testing; report to include:

a. Description of installation deficiencies not resolved and recommended corrective action.

b. Statement certifying the equipment and appurtenances are properly installed in accordance with manufacturer's requirements and recommendations except for deficiencies noted above.

3.5 DEMONSTRATION/ACCEPTANCE TEST

A. **Dry Test.** Before induction of the flow, the Contractor shall demonstrate proper operation in the dry.

B. **Wet Test.** After a successful initial start-up the UV manufacturer shall notify the Engineer/Architect, in writing, that he is prepared to begin a 30 day acceptance test. The Engineer/Architect shall then provide written notification to the Contractor to proceed with the acceptance testing. If the construction is completed after the disinfection season, the Contractor shall prepare the UV modules for storage. At the beginning of the following disinfection season, the Contractor shall return to start up the UV system for the acceptance test.

C. **Acceptance Test**

The maintenance of the UV equipment during the acceptance test shall be performed by the Contractor/Equipment Supplier.

2. The operation, sampling, and analysis during the test period shall be performed by the Owner.

3. Sampling for fecal coliform shall be once a week by grab sample for 4 consecutive weeks.

4. The test will be considered successful if the fecal coliform count does not exceed 200 per 100 ml for the four samples.

5. Start-up and operation of the UV system shall be in accordance with the Maintenance and Operating (M&O) instructions. If deviations are necessary, these shall be noted and revisions shall be made to the M&O instructions.

6. Plant outages that occurred should be noted, and outage time is not to be included in the acceptance testing period.

7. An operational log shall be kept by the Owner for the UV system during the test period. All changes in status or system parameters, adjustments shall be included. Entries shall be made noting date and time. Copy of the operational log shall be submitted weekly to the Engineer/Architect.

8. Within 2 weeks of the termination or completion of the acceptance testing, the Contractor shall submit for approval:

   a. Any changes to M&O instructions.
   b. A report of the acceptance test describing any equipment utilized, repairs/modifications made, or other work performed during the test period. Also include results of the fecal coliform analysis.

9. The Engineer/Architect and/or the Owner shall, within 10 days following the date of receipt of the acceptance test report, notify the UV manufacturer and/or supplier in writing his approval or disapproval of the acceptance test results.

D. **Retest.** In the event the results of the acceptance test indicate a deficiency in the system to meet the field test or design guarantees, the UV manufacturer and/or supplier shall, no later than 7 days after the initial acceptance test, and at no cost to the Owner, first have the right to take additional data, make adjustments to the system, check and revise the Owner's operating procedures (for his own test), and then request a new acceptance test. The retest will be conducted at the UV manufacturer and/or supplier's expense, including any fees that may have been levied against the Owner by regulatory agencies for noncompliance with the

C. **North WWTP UV Disinfection Unit**

1.	Peak Flow	7 gpm
2.	Average Flow	2,400 gpd
3.	Platform Height above Tank	9 feet
4.	Minimum Cord Length Between Lamp Modules and Ballasts/ Control Panel	20 feet

END OF SECTION